Los Alamos Science

LOS ALAMOS NATIONAL LABORATORY

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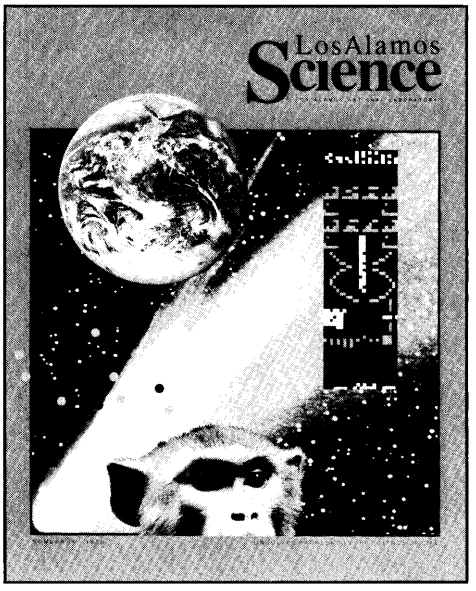
UNSOLVED PROBLEMS IN THE SCIENCE OF LIFE



The images on the cover symbolize the wide range of problems discussed in this issue:

Monkeys have been used to study the processing of visual information in the brain (Life Nature Library, *The Primates*, photograph by Yale Joel (c) 1965 Time-Life Books, Inc.).

A comet such as Comet West, photographed on March 8, 1976, by Dr. John W. Harvey with the Case Western Reserve/Kitt Peak National Observatory Burrell-Schmidt telescope, may have been responsible for one of our planet's catastrophic extinctions of life (National Optical Astronomy Observatories).

This Apollo 17 view of the earth (NASA) symbolizes the delicate fabric of physical coincidences that has led both to our existence and our consciousness of that existence.

Will we speak to other intelligent civilizations with, for example, this translation of binary code transmitted by the Arecibo radio telescope? Depicted (from the bottom moving upward) are the radio telescope, the sun and planets with the earth offset, a human form, the double helix of the DNA molecule, and the chemical formulae for the constituent compounds of DNA (Carl Sagan and Frank Drake).

It was an unusually stimulating day and a half at Los Alamos when two Nobel Laureates in physiology, a leading paleontologist, and a leading bio-astrophysicist came together to discuss "Unsolved Problems in the Science of Life," the topic of the second in a series of special meetings sponsored by the Fellows of the Laboratory. Just like the first one on "Creativity in Science," this colloquium took us into a broader arena of ideas and viewpoints than is our usual daily fare. To contemplate the evolution and mysteries of intelligent life from the speakers' diverse points of view at one time, in one place was indeed a rare experience.

George Wald began by reciting a litany of "accidents" of nature that have made life possible and juxtaposing these against our ignorance about the nature of consciousness. He then proposed a point of view heretical for a scientist—namely that consciousness or mind is ever present throughout the universe, operating as a complement to matter and causing the little "accidents" that are really no accident at all.

David Hubel took exception to this mystical approach and emphasized instead that mind or consciousness will eventually be understood by simply digging in and finding out one step at a time how the brain works. He then took us on a dazzling tour of the early stages of the visual system, demonstrating his many discoveries about the variety and specificity of the neural circuits responsible in part for form, movement, and color perception. Dr. Hubel commented before his talk that he had stuck needles into about 10,000 neurons in the course of his research. That is what he means by digging in!

Paleontologist Jack Sepkoski changed our focus from the mysteries of intelligent life to the mass extinctions of life that seem to have occurred periodically on this planet every 26 million years. While their causes remain a mystery, extinctions have clearly been an important factor in the evolution of new life forms.

Finally Frank Drake used a physicist's logic to convince us that we are not alone in the universe—but also that the economics of energy almost certainly precludes the chance of a visit from the extraterrestrials. Instead our best chance of contact is through radio signals, and such an effort is vigorously under way.

Well—the talks left everyone teeming with thoughts about the mysteries of the brain, the nature of consciousness, the fragility of our prominence on this planet, and the readiness of our culture to meet beings from another planet. We hope this issue devoted to the proceedings of the colloquium have a similarly stimulating effect on our readers.

The written versions of the talks were based directly on the transcripts and on the visuals provided by the speakers. We thank George Wald, David Hubel, Jack Sepkoski, and Frank Drake for their help in preparing this volume. We also thank the principal organizers of the conference, Art Cox, Ed Flynn, Carl Orth, and Mudundi Raju, for reviewing the transcripts and Mark Bitensky for moderating the morning of very lively discussion that followed the formal presentations. ■

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